



PROBABILI TY

CLASS 11

MODULE 1



SOME REAL LIFE SITUATIONS

The 50-50-90 rule: Anytime you have a 50-50 chance of getting something right, there's a 90% probability you'll get it wrong.



When flipping a coin, there is a 50% probability it will be head.

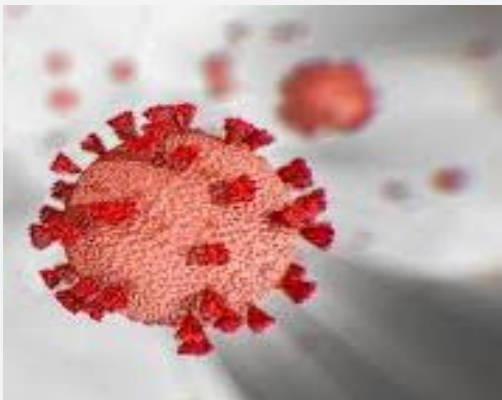


There are 9 red candies in a bag and 1 blue candy in the same bag. The chance of picking a blue candy is 10%.

In a drawer of ten socks where 8 of them are yellow, there is a 20% chance of choosing a sock that is not yellow.



If you are staying at home, the probability of not being affected by covid-19 is almost 99%



Previous Knowledge

Eg: A COIN IS TOSSED
10 TIMES, GOT 6H,4T
 $P(H) = 6/10; P(T) = 4/10$

- ❑ In Class IX, we learnt to find the probability on the basis of observations and collected data. This is called **statistical approach of probability (empirical or experimental probability)**.
- ❑ In class X, $P(E)$, we find the ratio of the number of outcomes favourable to the event, to the total number of equally likely outcomes. This theory of probability is known as **classical theory of probability (theoretical probability)**.

$P(H) = 1/2; P(T) = 1/2$

Different approach to probability

- ✓ **Statistical approach:** Observation and data collection.
- ✓ **Classical approach:** Only equally likely events.
- ✓ **Axiomatic approach:** For real life events. It closely relates to set theory.

For e.g. A committee of 2 persons is selected from 3 men and 4 women. Find the probability that the committee will have no man?

- In this Chapter, we will study about the **axiomatic approach of probability**. To understand this approach we must know about few basic terms viz. **random experiment, sample space, events, etc.**

TERMINOLOGY



Random Experiments:

An experiment is called a random experiment if it satisfies the following two conditions:

- (i) It has more than one possible outcome.
- (ii) It is not possible to predict the outcome in advance.

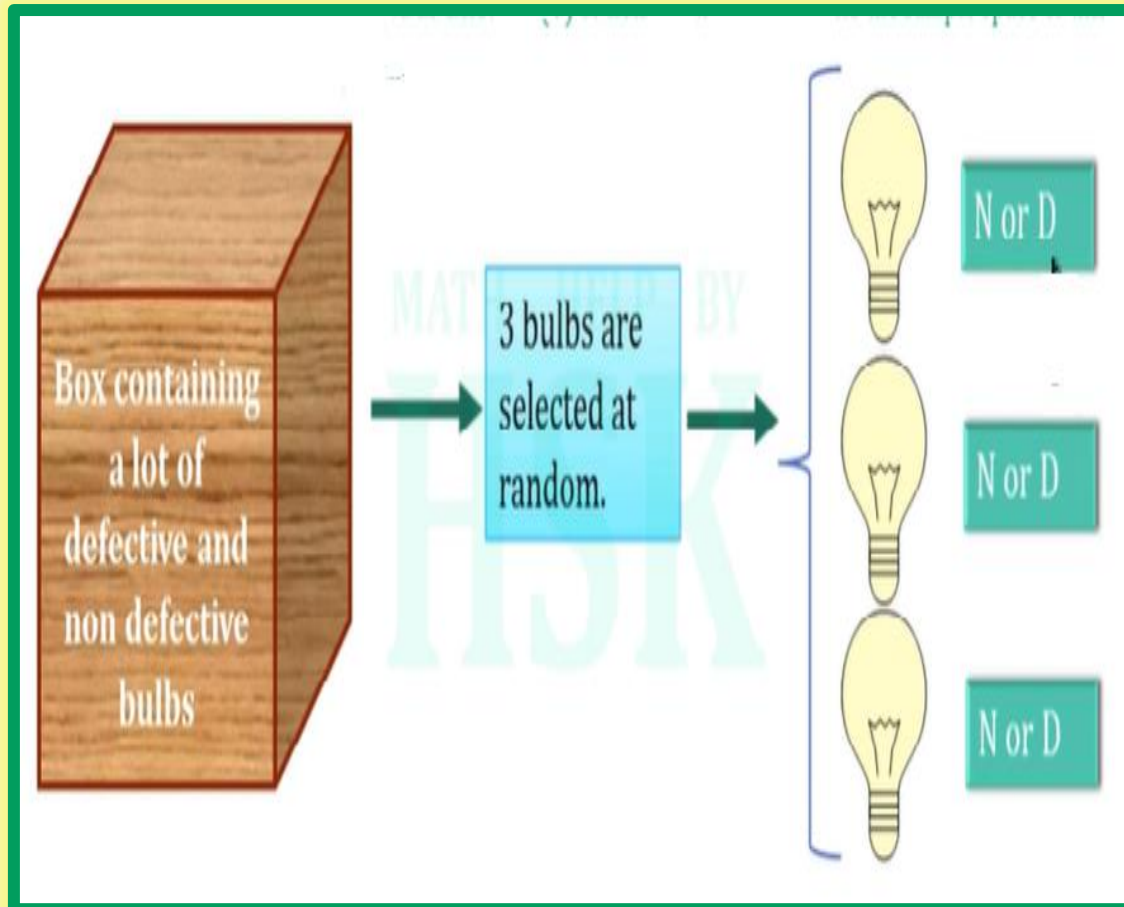
Eg: SODIUM AND
CHLORINE COMBINE
IN LAB?????

Outcomes and sample space: A possible result of a random experiment is called its outcome.

E.g. Consider the experiment of rolling a die.

- ❖ The **outcomes** of this experiment are 1, 2, 3, 4, 5, or 6
- ❖ The set of outcomes $\{1, 2, 3, 4, 5, 6\}$ is called the **sample space** of the experiment.
- ❖ Each element of the sample space is called a **sample point**.

Suppose 3 bulbs are selected at random from a lot. Each bulb is tested and classified as defective (D) or non-defective (N). Write the sample space of this experiment.



Result when 1 st bulb is checked	Result when 2 nd bulb is checked	Result when 3 rd bulb is checked
N	N	N
N	N	D
N	D	N
N	D	D
D	N	N
D	N	D
D	D	N
D	D	D

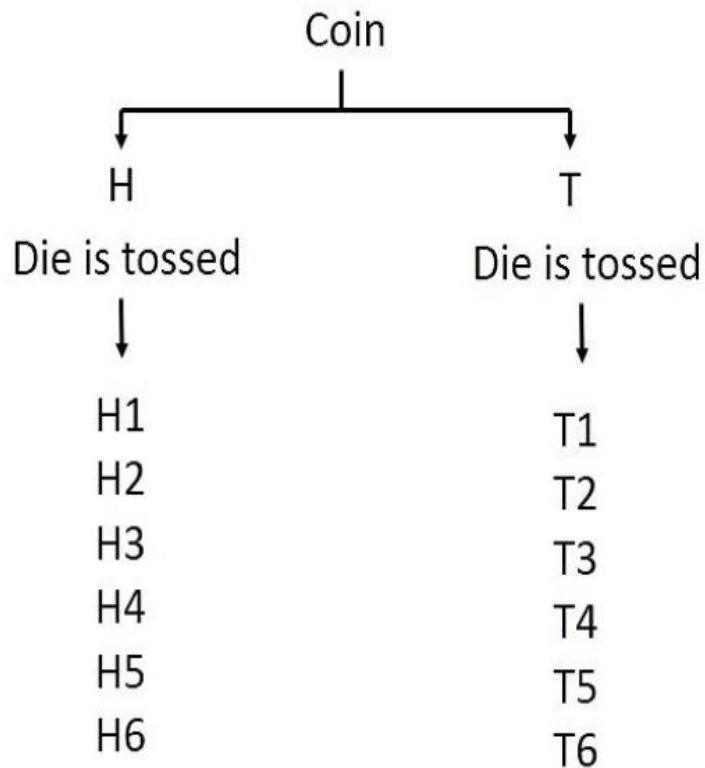
$S = \{NNN, NND, NDN, NDD, DNN, DND, DDN, DDD\}$

Ex 16.1

LET'S PRACTICE

Describe the sample space for the indicated experiment: A coin is tossed and a die is thrown.

Coin is tossed and die is rolled



When coin tossed	When die rolled
H	1
T	2
	3
	4
	5
	6

$$S = \left\{ (H,1), (H,2), (H,3), (H,4), (H,5), (H,6), (T,1), (T,2), (T,3), (T,4), (T,5), (T,6) \right\}$$



Ex 16.1

A box contains 1 red and 3 identical white balls. Two balls are drawn at random in succession without replacement. Write the sample space for this experiment.

The two balls selected at random in succession without replacement

The sample space is

$$S = \{RW, WR, WW\}$$

1 st ball	2 nd ball
R	W
W	R
W	W

Ex 16.1

2 boys and 2 girls are in Room X, and 1 boy and 3 girls in Room Y.
Specify the sample space for the experiment in which a room is selected and then a person.

Room X

Let B_1, B_2 and G_1, G_2 are the boys & girls in room X

Possible outcomes

When room X is selected then a person

$\{XB_1, XB_2, XG_1, XG_2\}$

Room Y

B_3 , and G_3, G_4, G_5 are the boys & girls in room Y

Possible outcomes

When room Y is selected then a person

$\{YB_3, YG_3, YG_4, YG_5\}$

Hence

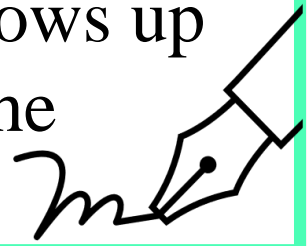
The sample space S is

$S = \{XB_1, XB_2, XG_1, XG_2, YB_3, YG_3, YG_4, YG_5\}$



Ex 16.1

A coin is tossed. If the outcome is a head, a die is thrown. If the die shows up an even number, the die is thrown again. What is the sample space for the experiment?



(i) If **head comes**, throw a die

The possible outcomes are
 $\{H1, H2, H3, H4, H5, H6\}$

(ii) & If die show even number

i.e. H2, H4 & H6
again throw a die

(iii) If **tails comes**

Possible outcomes = $\{T\}$

Possible outcomes are = $\left\{ \begin{array}{l} H21, H22, H23, H24, H25, H26, \\ H41, H42, H43, H44, H45, H46, \\ H61, H62, H63, H64, H65, H66 \end{array} \right\}$

Hence,

S be the sample space with the given experiment

$$S = \left\{ \begin{array}{l} T, \\ H1, H3, H5, \\ H21, H22, H23, H24, H25, H26, \\ H41, H42, H43, H44, H45, H46, \\ H61, H62, H63, H64, H65, H66 \end{array} \right\}$$



Ex 16.1

The numbers 1, 2, 3 and 4 are written separately on four slips of paper. The slips are put in a box and mixed thoroughly. A person draws two slips from the box, one after the other, without replacement. Describe the sample space for the experiment.

Ans. When two slips are drawn from the box without replacement then the sample space is

$$S = \{(1, 2), (1, 3), (1, 4), (2, 1), (2, 3), (2, 4), (3, 1), (3, 2), (3, 4), (4, 1), (4, 2), (4, 3)\}$$

ASSIGNMENTS

TRY

- 1) A die is thrown repeatedly until a six comes up. What is the sample space for this experiment?
- 2) Suppose 3 bulbs are selected at random from a lot. Each bulb is tested and classified as defective (D) or non – defective(N). Write the sample space of this experiment.
- 3) A coin is tossed. If it shows a tail, we draw a ball from a box which contains 2 red and 3 black balls. If it shows head, we throw a die. Find the sample space for this experiment.
- 4) An experiment consists of rolling a die and then tossing a coin once if the number on the die is even. If the number on the die is odd, the coin is tossed twice. Write the sample space for this experiment.
- 5) An experiment consists of tossing a coin and then throwing it second time if a head occurs. If a tail occurs on the first toss, then a die is rolled once. Find the sample space.



Thank You and Happy Learning

